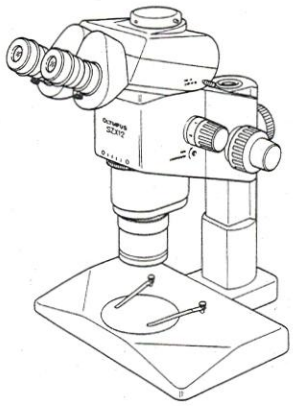
OLYMPUS®

SZX9/12
SZX-EPA
SZX-AS
SZX-R
SZX-2RE
SZX-STAD1
SZX-STAD2
SZH-STAD1



INSTRUCTIONS

SZX

RESEARCH STEREOMICROSCOPE SYSTEM

This instruction manual is for the Olympus SZX Research Stereomicroscope System. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

IMPORTANT

⚠ SAFETY PRECAUTIONS

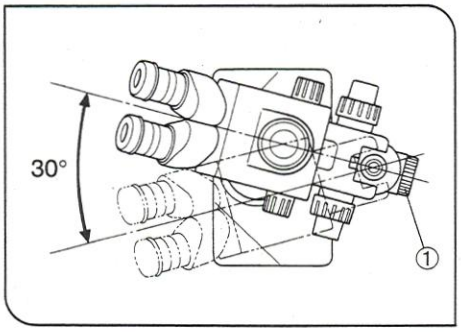


Fig. 1

1. To prevent the microscope body from turning over, its pivot angle must be limited to 30° as shown in Fig. 1.
2. Sufficient care is required during observation with a magnification objective, because the objective's long working distance can displace the microscope body to a higher position. Care is also required when using an auxiliary pillar (SZH-P400/P600), which also makes the microscope body unstable.
3. To adjust the microscope body height, be sure to hold the focusing assembly with one hand while loosening the focusing assembly clamping knob ①. (Fig. 1)
   (Use the drop prevention collar (SZX-R) to prevent a hazard from occurring.)
   ‹Be careful not to pinch your finger during adjustment.›

1 Getting Ready

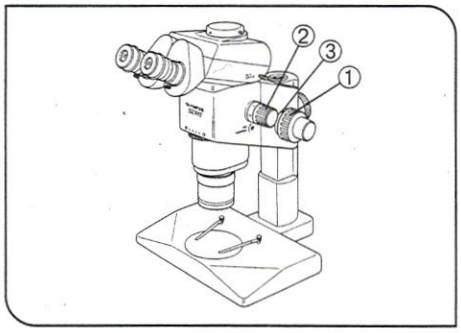


Fig. 2

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, or vibration. (For operating environment, see Section 6, "Specifications" on page 16.)
3. Observe the following cautions when operating the coarse or fine focus adjustment knobs or the zooming knob.

Operation	Manipulated Controls	Caution
Focusing	Coarse/fine focus adjustment knobs ① (Fig. 2)	1. If the knob hits the upper or lower limiting mechanism violently or it is rotated after it hits a limiting mechanism, the internal mechanism may be damaged.
		2. If the knobs on the left and right are rotated in opposite directions, the internal mechanism will be damaged. (The tension of the coarse focus adjustment knob should be adjusted using the tension adjustment ring ③ on the knob.)
Zooming	Zooming knob ② (Fig. 2)	1. If the knob hits the upper or lower limiting mechanism violently or it is rotated after it has hit a limiting mechanism, the internal mechanism may be damaged.
		2. If the knobs on the left and right are rotated in opposite directions, the internal mechanism will be damaged.

4. Only one intermediate attachment can be used. Using two attachments may obscure a part of the image. However, the vertical illuminator (SZX-ILLC) is not considered to be an attachment.

◎When more than one intermediate attachment is to be combined, they should be stacked according to the following order, from the bottom to the top: SZX-ILLC, SZX-AS, SZX-RFA (SZX-RFL), SZX-SDO, SZX-APT, SZX-BS, SZX-DA, SZX-FAD, then SZX-EPA.

5. The desk surface inclination with respect to the horizontal surface should be less than 5°.

2 Maintenance and Storage

1. Clean all glass components by wiping gently with gauze. To remove fingerprints or oil smudges, wipe with gauze slightly moistened with a mixture of ether (70%) and alcohol (30%).

⚠Since solvents such as ether and alcohol are highly flammable, they must be handled carefully. Be sure to keep these chemicals away from open flames or potential sources of electrical sparks – for example, electrical equipment that is being switched on or off. Also remember to always use these chemicals only in a well-ventilated room.

2. The equipment uses plastic resins extensively in its external finish. Do not attempt to use organic solvents to clean the non-optical components of the microscope. To clean these components, use a lint-free, soft cloth lightly moistened with a diluted neutral detergent.
3. Never disassemble any part of the microscope as this could result in malfunctions or reduced performance.
4. When not using the microscope, keep it covered with the dust cover provided.

3 Caution

If the microscope is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the microscope may also be damaged. Always use the microscope as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.

⚠ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).

★ : Indicates that failure to follow the instructions could result in damage to equipment.

◎ : Indicates commentary (for ease of operation and maintenance).

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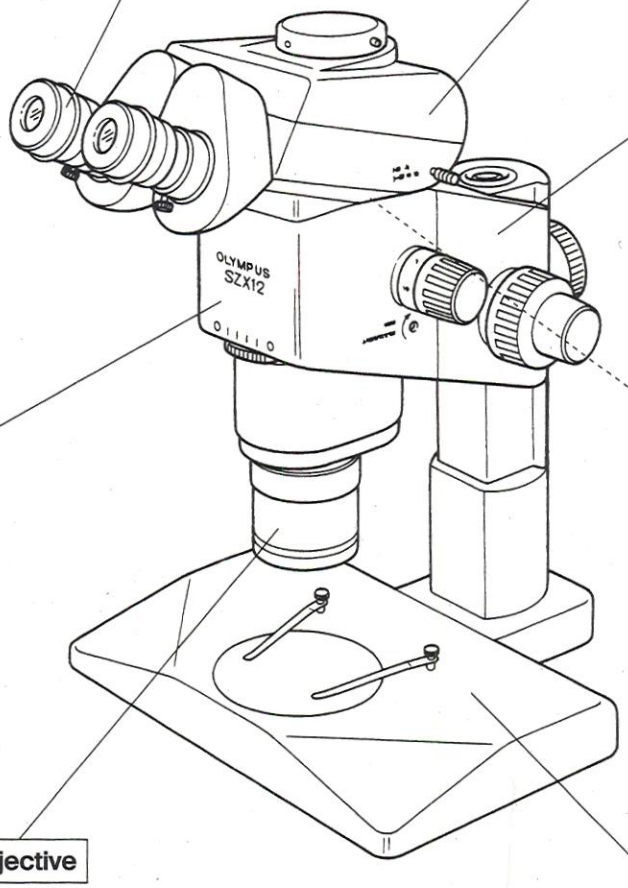
1 NOMENCLATURE



Eyepiece
- WHS10X-H
- CROSS WHS10X
- WHS15X-H
- CROSS WHS15X
- WHS20X-H
- CROSS WHS20X
- WHS30X-H

Observation tube
- Binocular observation tube: SZX-BI30
- Trinocular observation tube: SZX-TR30
- Tilting binocular tube: SZX-TBI

Focusing assembly
- Coarse/fine focus adjustment knobs: SZX-FOF
- Focus adjustment knob: SZX-FO

Intermediate attachment**
- Eyepoint adjuster: SZX-EPA
- AS unit: SZX-AS

etc.

Microscope body
- 12X zoom microscope body: SZX-ZB12
- 9X zoom microscope body: SZX-ZB9

Objective

《For SZX-ZB12》
- DFPLFL0.3X*
- DFPLFL0.45X*
- DFPLFL0.5XPF
- DFPLAPO1XPF
- DFPLAPO1.2XPF
- DFPLFL1.6XPF
- SZX-AL20X

《For SZX-ZB9》
- DFPL0.5X*
- DFPL0.75X
- DFPLAPO1X-2
- DFPL1.5X
- DFPL2X-3
- SZX-ACH1X

Base**
- Standard base: SZX-ST
- Large base: SZX-STL
- Transmitted light base: SZX-ILLK/B/D

* The standard base (SZX-ST) requires use of an optional auxiliary pillar (SZH-P400) and optional drop prevention collar (SZX-R). The large base (SZX-STL) comes with the auxiliary pillar (SZH-P400) mounted as standard. This enables the large base to be used as is. However, be sure to use the drop prevention collar (SZX-R) in combination.

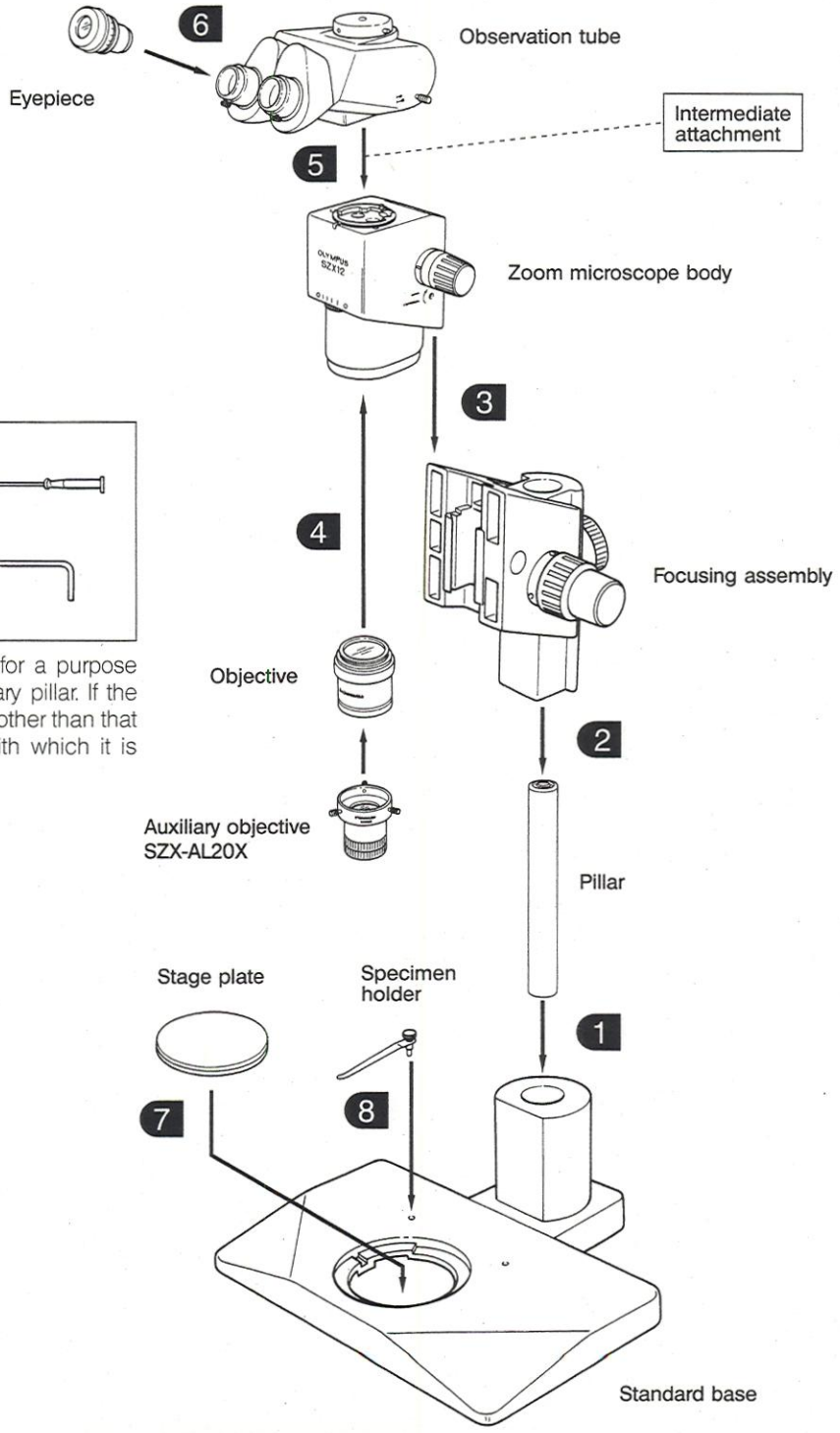
** For other attachments, refer to the product catalogue.

2 ASSEMBLY

2-1 Assembly Diagram

The diagram below shows how to assemble the various modules. The numbers indicate the order of assembly.

★**When assembling the microscope, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.**



Required tools

Allen screwdriver
(provided with the zoom microscope body)

Allen wrench*
(provided with the standard base)

* Do not use the Allen wrench for a purpose other than installing the auxiliary pillar. If the Allen wrench is used for a part other than that described above, the force with which it is applied may break the part.

2-2 Detailed Assembly Procedure

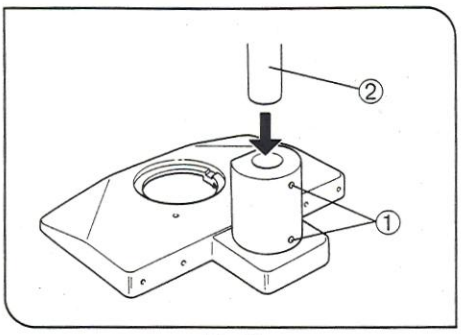


Fig. 3

1 Installing the Pillar (Fig. 3)

1. Using the Allen wrench provided with the base, loosen the 2 clamping screws ① on the pillar support sleeve completely.
2. Hold the pillar ② with the white rubber cap at the top, and insert it into the pillar support sleeve until it reaches the bottom.
3. Using the provided Allen wrench, tighten the 2 clamping screws ② securely.

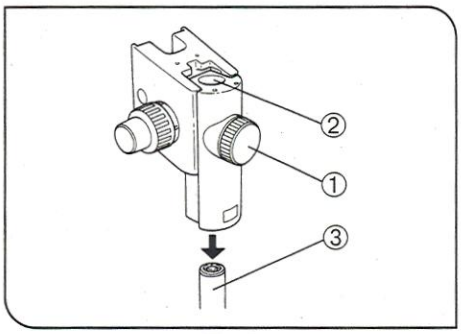


Fig. 4

2 Mounting the Focusing Assembly (Figs. 4 & 5)

1. First loosen the focusing assembly clamping knob ① completely, and while holding the focusing assembly with both hands, insert the pillar ③ into the mounting hole ② from below. (Fig. 4)

★ **Insert slowly. Do not apply excessive force.**

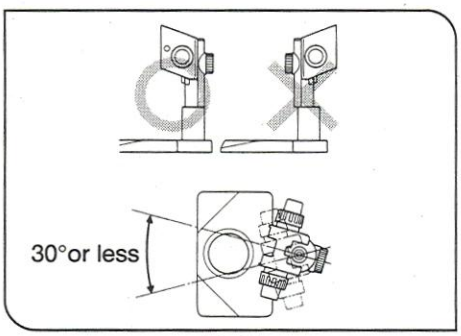


Fig. 5

2. Lower the focusing assembly until it stops, then tighten the focusing assembly clamping knob ①. (Fig. 4)

⚠ **To prevent the microscope from turning over, the focusing assembly must be installed on the same side as the stage plate in the stand, as shown in the illustration marked "O" in Fig. 5, and its pivot angle must be limited to 30°. If the focusing assembly is placed on the wrong side, the microscope will turn over.**

★ **If the clamping knob ① is tightened while the pillar ③ is not completely inserted into the mounting hole ②, the plate spring supporting the pillar will deform and the pillar will not be able to penetrate into the hole. (Fig. 4)**

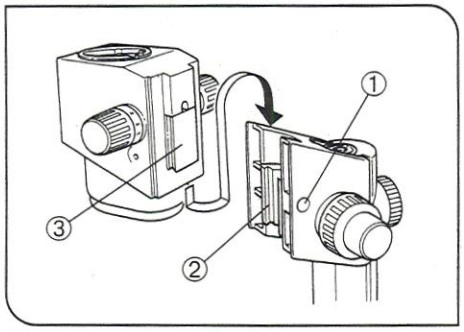


Fig. 6

3 Mounting the Microscope Body (Fig. 6)

1. Remove the cap ① on the focusing assembly by inserting a thin object into the notch.
2. Using the provided Allen screwdriver, loosen the dovetail mount clamping screw inside the cap on the focusing assembly by rotating it by 2 or 3 turns (counterclockwise).
3. Gently insert the dovetail mount ③ on the rear of the microscope body into the dovetail mounting port ② on the focusing assembly.

★**Do not insert the mount at an angle or with excessive force, for this may cause malfunctions.**

4. When the microscope body has been inserted until it stops, tighten the clamping screw using the Allen screwdriver.
5. Place the cap ① in the original position.

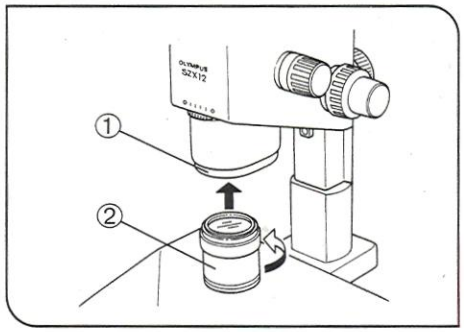


Fig. 7

4 Mounting the Objective (Fig. 7)

Mount the objective ② on the objective mount thread ① by rotating the objective in the direction of the arrow.

Mounting the Auxiliary Objective SZX-AL20X (SZX-ZB12 only)

When using the auxiliary objective (SZX-AL20X), mount it onto the tip of the DFPLAPO1XPF objective and tighten the clamping screw while pushing it against the tip. (See page 10.)

Remember that the SZX-AL20X cannot be used with other objectives.

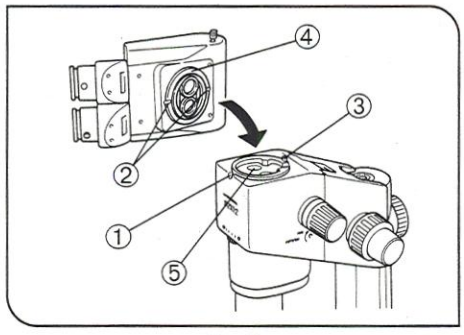


Fig. 8

5 Mounting the Observation Tube (Fig. 8)

1. Using the Allen screwdriver, loosen the observation tube clamping screw ① completely.
2. Aligning the positioning pin ③ of the microscope body to the positioning groove ② on the observation tube, insert the dovetail mount ④ at the bottom of the observation tube into the mounting port ⑤ on the microscope body.
3. Using the Allen screwdriver, tighten the observation tube clamping screw ①.

★**The observation tube can be mounted 180° from the above position, but this positioning makes observation difficult and is not recommended. When the auxiliary pillar is used, this positioning is impossible because the eyepiece gets in the way.**

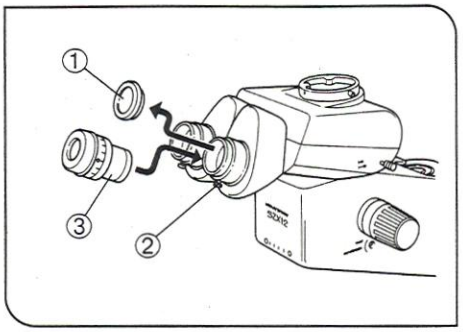


Fig. 9

6 Mounting the Eyepiece (Fig. 9)

1. Remove the eyepiece dust caps ① and loosen the eyepiece clamping screws ② completely.
2. Gently insert the cross-lined eyepiece (CROSS WHS10X) ③ (if this is not provided, use the WHS10X-H) into the right eyepiece sleeve until it stops.
3. Gently insert the eyepiece (WHS10X-H) into the left eyepiece sleeve until it comes up against the stop.
4. Tighten both eyepiece clamping screws ②.

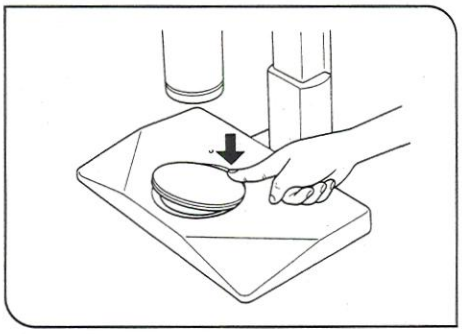


Fig. 10

7 Mounting (Removing) the Stage Plate (Fig. 10)

Place the stage plate (white, black on back side) into the mounting hole on the base.

To remove, press the stage plate at the edge nearest to the pillar with your fingertip. The opposite end will rise from the base so the stage plate can be picked up easily.

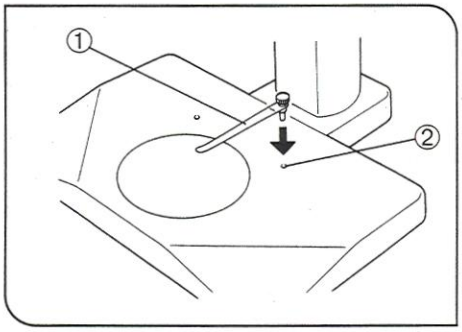


Fig. 11

8 Mounting the Specimen Holder (Fig. 11)

Insert the specimen holder ① into the 2 holes ② on the top surface of the base.

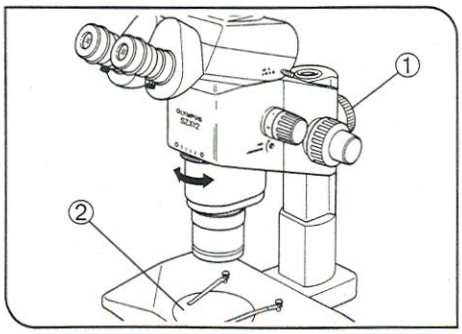
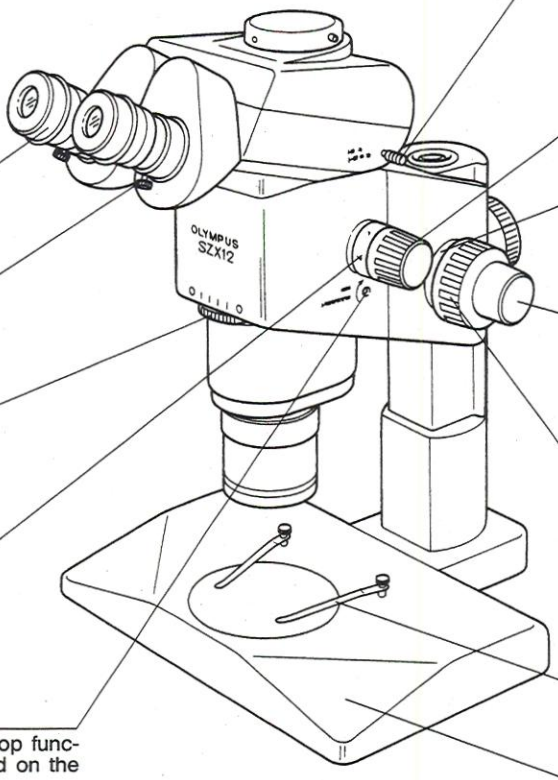


Fig. 12

9 Positioning the Microscope Body on the Stand (Fig. 12)

Loosen the focusing assembly clamping knob ①. Slightly pivoting the microscope body to the left and right, align the center of the objective with the center of the stage plate ②, then clamp the microscope body with the focusing assembly clamping knob.

3 CONTROLS



Light path selector knob
(SZX-TR30 only)

Zooming knob
SZX-ZB12: 0.7X to 9X
SZX-ZB9: 0.63X to 5.7X

Coarse focus adjustment knob
tension adjustment ring

Diopter adjustment ring
±5m^{-1} (per meter)

Eyepiece clamping knob

Fine focus adjustment knob
(SZX-FOF only)
Stroke: 80 mm
Stroke per turn: 1.5 mm

Aperture iris diaphragm ring
(SZX-ZB12 only)

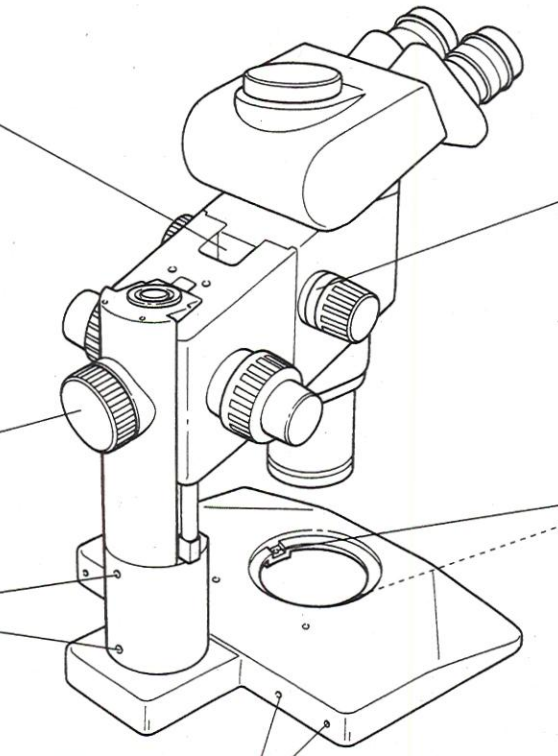
Coarse focus adjustment knob
Stroke: 80 mm
Stroke per turn (SZX-FOF): 36.8 mm
Stroke per turn (SZX-FO): 21.2 mm

Observation magnification indicator
Shows the total magnification when the objective is 1X and eyepiece is 10X.

Click stop ON-OFF screw
Engages or disengages the click stop function for each magnification indicated on the zooming knob.

Specimen holder

Hand rest



Light guide hole
SZX-CSP/LG-DFI mounting holes

Magnification indicator ring
Provided with the objective (except 1X objective).
◎ Can also be attached onto the right zooming knob.

Focusing assembly clamping knob

Stage adapter screw hole
(4 mm threaded x 2)

Pillar clamping screws

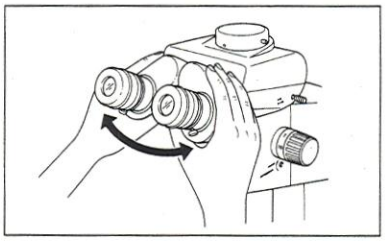
Spare screw holes
(4 mm threaded holes x 4)
Used to mount a manipulator, etc.

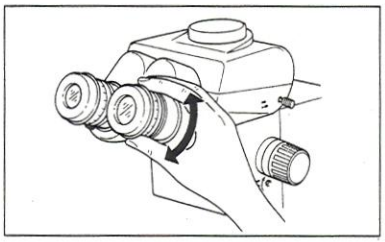
4 SUMMARY OF OBSERVATION PROCEDURE

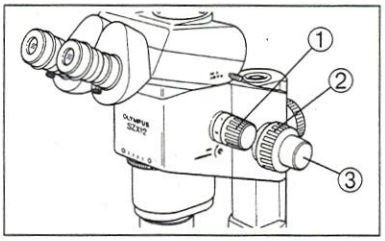
4-1 Preparation

1. Check and tighten the connection of each component, especially the observation tube. (Page 4)
2. Adjust the position of the microscope body. (Page 5)
3. Adjust the tension of the coarse focus adjustment knob. (Page 8)
4. Prepare desired illuminators.

4-2 Observation Procedure







1. Place a specimen on the stage. (Page 8)

2. Adjust interpupillary distance. (Page 11)

3. Make diopter adjustment. (Page 11)

   (The adjustment procedure is variable depending on whether a CROSS eyepiece is used or not.)

4. Set the zooming knob ① to the lowest zoom magnification and bring the microscope into focus by rotating the coarse focus adjustment knob ②.

5. Rotate the zooming knob ① to the desired magnification and precisely focus the microscope on the specimen with the coarse focus adjustment knob ② and fine focus adjustment knob ③ (the fine focus adjustment knob is not provided with the SZX-FO).

◎When the SZX-ZB12 microscope body is used, the contrast of the observed image and the focal depth of the specimen can be adjusted with the built-in aperture iris diaphragm ring.

5 USING THE CONTROLS

5-1 Base

1 Using the Stage Plate

When reflected light is used, the stage plate is usually placed with the white side facing up. In case the specimen is white or other bright colors, place the stage plate with the black side up to improve contrast.

★**When transmitted light is used, use the transparent glass stage plate (SP-C).**

2 Placing the Specimen

1. Place the specimen on the approximate center of the stage plate. Hold the specimen with the specimen holder as required.
2. Illuminate the specimen with an illuminator selected according to the specimen under observation.

5-2 Microscope Body and Focusing Assembly

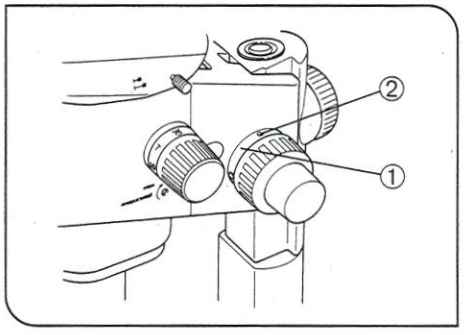


Fig. 13

1 Adjusting the Tension of the Coarse Focus Adjustment Knob (Fig. 13)

★**The tension of the coarse focus adjustment knob can be adjusted with the tension adjustment ring ①. Do not rotate the knobs on the left and right in opposite directions, for this will damage the internal mechanism.**

1. Rotate the tension adjustment ring ① by inserting the Allen screwdriver into the hole ② on the ring periphery.
   Rotating the ring clockwise increases the tension of the coarse focus adjustment knob, and rotating counterclockwise decreases it.

★**If the microscope body falls down by its own weight or the focus obtained by fine focusing is lost immediately, the tension adjustment may be too light. In this case, rotate the ring clockwise to increase the tension.**

★**If the tension adjustment is too tight, delicate focusing will be impossible and the knob may be damaged. Particularly, never rotate the fine focus adjustment knob quickly while its tension is extremely tight.**

2 Engagement and Disengagement of the Zooming Knob Click Stop Function (Fig. 14)

◎When the click stop knob is set to ON, the click stop function is engaged for each magnification indicated with the zooming knob. When the knob is set to OFF, the zoom magnification can be varied continuously and finely near the click groove.

◎A click stop can be provided for each of the 9 intermediate indications of the zoom microscope body, regardless of the SZX-ZB12 or SZX-ZB9.

1. To engage the click stop function, rotate the click stop ON-OFF screw ① fully clockwise (in the direction of the arrow) using the Allen screwdriver. The zooming knob then stops at every position corresponding to the magnification indicated on the observation magnification indicator ②.
2. To disengage the click stop function, rotate the click stop ON-OFF screw ① fully clockwise (by one turn from the ON position, in the direction opposite to the arrow) using the Allen screwdriver.

★ **Do not rotate too much, or the cover may be damaged.**

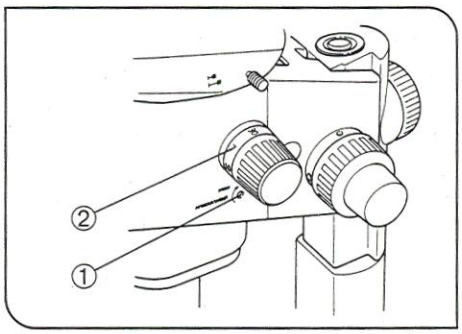


Fig. 14

3 Adjusting the Aperture Iris Diaphragm (SZX-ZB12 only) (Fig. 15)

◎Adjusting the aperture iris diaphragm increases the contrast of the observed image as well as the depth of focus.
However, setting the aperture iris diaphragm too narrowly degrades resolution.

1. Adjust the aperture iris diaphragm ring ① to the left or right.
Rotating the ring toward the left "O" opens the aperture; rotating it toward the right "⊗" closes it. Adjust while monitoring the observed image to confirm the contrast and focal depth improvement effects.

★ **Do not close the aperture too much, for this may cause degradation in resolution and/or lack of ambient light.**

2. Use the scale gradations as references for memorizing the ring position.

★ **When the microscope is combined with the coaxial vertical illuminator (SZX-ILLC), minimizing the aperture may obscure a part of the observed field of view. In this case, open the aperture to an intermediate position.**

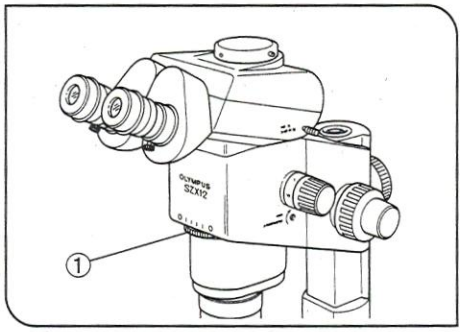


Fig. 15

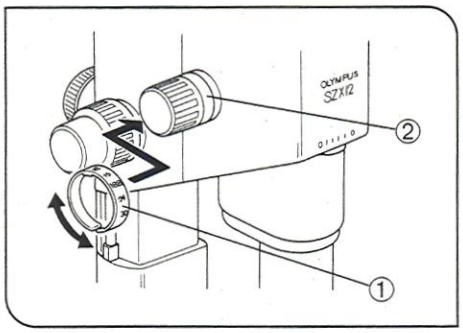


Fig. 16

4 Magnification Indicator Ring (Fig. 16)

◎Every objective other than the 1X objective is provided with an observation magnification* indicator ring.

* This refers to the total magnification when the 10X eyepiece is used.

◎When the revolving nosepiece (SZX-2RE) is used, the total observation magnifications when two objectives are switched can be read directly by mounting these rings on the left and right zooming knobs.

1. Hold the magnification indicator ring ① in an orientation allowing correct magnification reading from the front of the microscope, widen the ring and mount onto the base of the left zooming knob ②.
2. Rotate the magnification indicator ring gently until it stops at the specified position.

★A magnification indicator ring can also be mounted on the right zooming knob in the same way as above, but this makes the total observation magnification when the 1X objective is used unreadable.

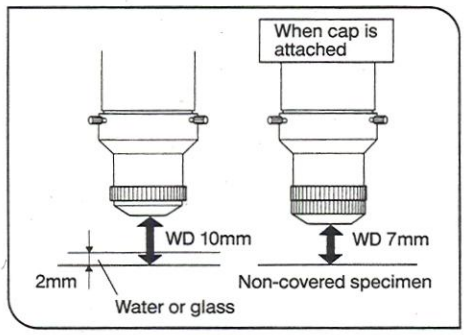


Fig. 17

5 Using the Auxiliary Objective (SZX-AL20X) (Figs. 17 - 19)

◎This is a 2.5X auxiliary objective for exclusive use with the DFPLAPO1XPF objective. It is effective for non-covered specimen observation when the cap is attached to the tip and for observation through a 2 mm-thick water or glass layer when the cap is removed. (Fig. 17)

★The recommended zoom magnifications for exhibiting high per-formance are the higher magnifications from 4X to 9X (i.e. total magnifications* of 100X to 225X). It is not advisable to use magnifications lower than 4X. If the zoom magnification is lower than 2X, part of the image will be obscured.

* Zoom magnification (4X to 9X) X Auxiliary objective (2.5X) X Eyepiece (10X)

Removing the Cap

Hold the rotary ring ① and rotate the fixing ring ② in the direction of the arrow to remove the cap. (Fig. 18)

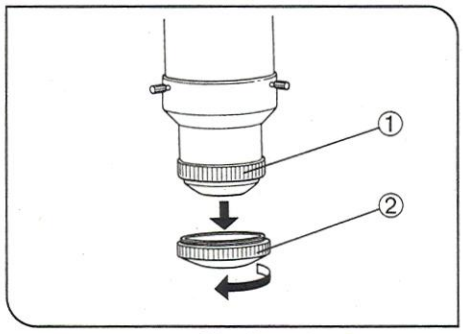


Fig. 18

Parfocal Correction Ring

◎This is convenient when using a parfocal objective (PF) with the SZX-2RE revolving nosepiece ③ and the SZX-AL20X. (Fig. 19)

• Attach the provided parfocal correction ring ④ to the DFPLAPO1XPF ⑤ by screwing in, then attach the SZX-AL20X ⑥. (Fig. 19)

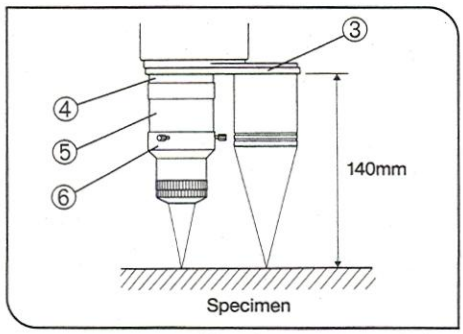


Fig. 19

5-3 Observation Tube

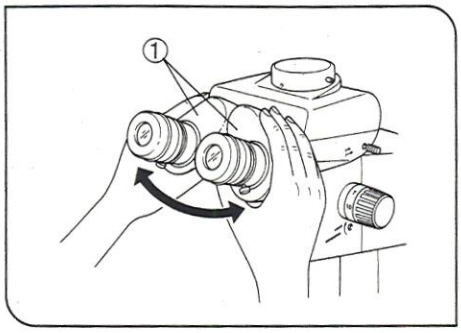


Fig. 20

1 Interpupillary Distance Adjustment (Fig. 20)

★ **Be sure to hold the binocular assembly ① with both hands to make this adjustment.**

While looking through the eyepieces, hold the left and right of the binocular assembly ① and adjust the eyepieces by opening or closing them for binocular vision until the left and right fields of view coincide completely.

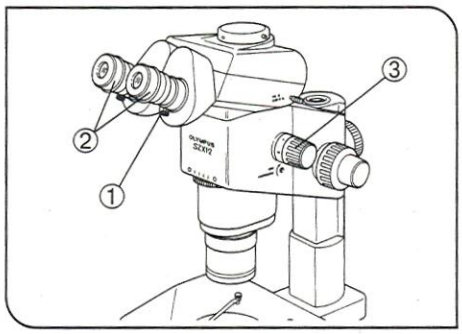


Fig. 21

2 Diopter Adjustment (Zoom Parfocal Adjustment) (Fig. 21)

★ **Ensure that the eyepiece clamping knob ① is tightened.**

When not using the CROSS eyepiece

1. Rotate the diopter adjustment rings ② of the eyepiece so that both scales indicate "0".
2. Place an easy-to-observe specimen on the stage plate.
3. Rotate the zooming knob ③ to a low magnification and focus the specimen using the coarse and fine focus adjustment knobs.
4. Rotate the zooming knob ③ to the highest magnification and focus the specimen using the coarse and fine focus adjustment knobs.
5. Rotate the zooming knob ③ to the lowest magnification, then focus the specimen by rotating the left and right diopter adjustment rings instead of the coarse and fine focus adjustment knobs.

When using the CROSS eyepiece

1. Look into the CROSS eyepiece and focus the cross lines by rotating the diopter adjustment rings.
2. Place an easy-to-observe specimen on the stage plate.
3. Rotate the zooming knob ③ to a low magnification and focus the specimen looking into the CROSS eyepiece and using the coarse and fine focus adjustment knobs.
4. Rotate the zooming knob ③ to the highest magnification and focus the specimen using the coarse and fine focus adjustment knobs.
5. Rotate the zooming knob ③ to the lowest magnification, then focus the specimen by rotating only the diopter adjustment ring of the non-CROSS side of the eyepiece instead of the coarse and fine focus adjustment knobs.

◎Note (or memorize) the diopter readings of the left and right eyepiece scales so that they can be duplicated quickly in the next observation.

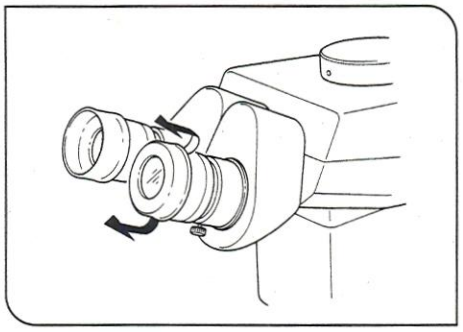


Fig. 22

3 Using the Eye Shades (Fig. 22)

When Wearing Eyeglasses

Use with eye shades in their normal folded-down position. This will prevent eyeglasses from being scratched by the eyepiece.

When Not Wearing Eyeglasses

Extend the folded eyeshades in the direction of the arrow. This makes observation easier by preventing the inverse incidence of light from between the eyepiece and your eyes.

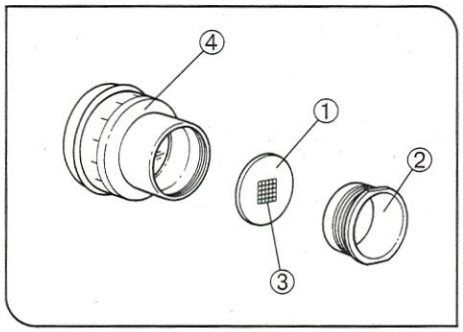


Fig. 23

4 Using the Eyepiece Micrometers (Fig. 23)

◎A variety of eyepiece micrometers ① can be inserted into the WHS10X-H/15X-H/20X-H/30X-H eyepieces. Use 24 mm dia. x 1.5 mm thick micrometer disks.

1. Unscrew and remove the ring ② from the bottom of each eyepiece.
2. Clean an eyepiece micrometer disk ① to remove dust and dirt, then place the disk into the ring ② so that the side with reticule ③ faces downward.
3. Attach the ring ② with the eyepiece micrometer disk ① by gently screwing it onto the eyepiece ④.

★The WHS20X-H/30X-H eyepieces are designed to apply the following magnifications to the focusing planes of the micrometers.
The WHS20X-H and WHS30X-H have magnifications of 1.35X and 2.03X respectively. When using these for measurement, be sure to perform magnification compensation.
When the micrometers are engaged in their light path, the light path length will extend and the diopter scale may deviate from the normal indication. However, this does not pose any problem in actual observation.

◎When the eyepiece micrometers ① are not used, wrap them in a clean sheet of soft paper and store.

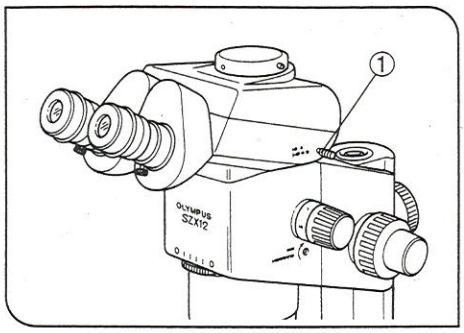


Fig. 24

5 Light Path Selection (SZX-TR30) (Fig. 24)

Slide the light path selector knob ① to select the desired light path.

Light Path Selector Knob	Indication	Intensity Ratio
Pushed in		100% for binocular eyepieces.
Pulled out		20% for binocular eyepieces. 80% for photomicrography and TV observation.

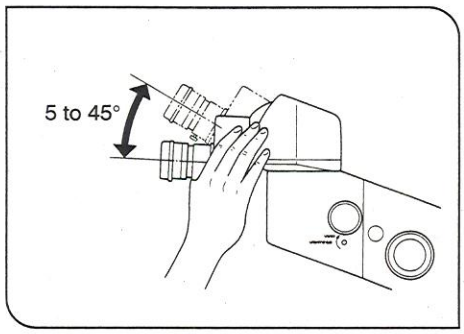


Fig. 25

6 Tilt Adjustment (SZX-TBI) (Fig. 25)

◎Adjust the height and tilt of the observation tube to the most comfortable viewing position.

Holding the binocular assembly with both hands, raise or lower it to the desired position.

★**Do not attempt to force the binocular assembly past the upper or lower stop positions. Applying excessive force could destroy the mechanism.**

5-4 Photomicrography

◎Use a trinocular observation tube (SZX-TR30) for taking photomicrographs.
Photomicrography can be performed using the PM-10, PM-20 or PM-30 photomicrographic system.
Procedures for operating the photomicrographic systems are described in their respective instruction manuals. Only the procedures specific to this microscope are described below.

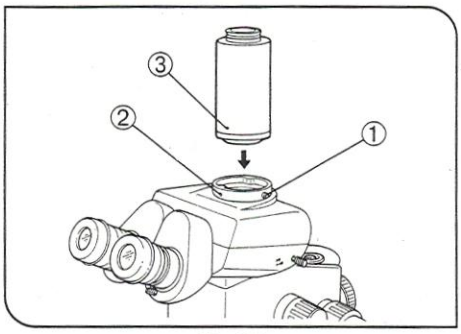


Fig. 26

1 Attaching the Straight Photo Tube (U-SPT) (Fig. 26)

1. Using the Allen screwdriver, loosen the clamping screw ① on the trinocular tube's photo port.
2. Align the index dot " • " ② on the front of the trinocular tube with the index dot " • " ③ on the straight photo tube, then insert the circular dovetail mount of the straight photo tube into the trinocular tube's photo port.
3. Tighten the clamping screw ①.

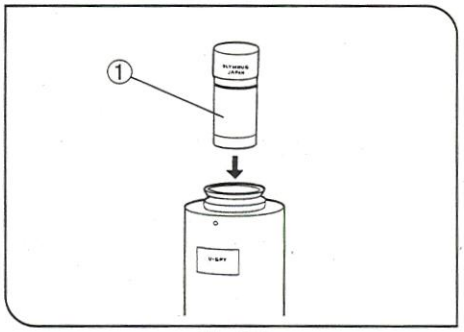


Fig. 27

2 Photo Eyepiece (Fig. 27)

Use only a PE photo eyepiece for photomicrography. Insert the photo eyepiece ① with the desired magnification into the photomicrographic system mount on the straight photo tube.

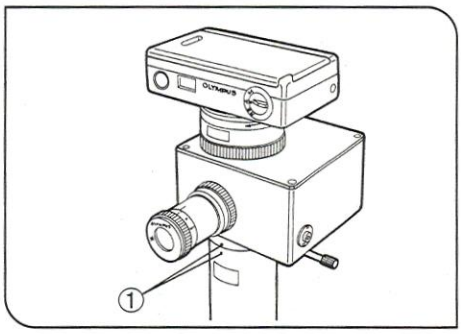


Fig. 28

3 Mounting the Photomicrographic System (Fig. 28)

Place the photomicrographic system directly over the photomicrographic system mount of the straight photo tube. Make sure that the index dots " • " ① of the straight photo tube and photomicrographic system are aligned, then clamp the system.

4 Selecting the Observation Tube Light Path

See page 13 of the "Light Path Selection" section.

5 Focus Adjustment (Fig. 29)

1. Camera focusing must be done using the viewfinder of the photomicrographic system.

★**The parfocal property between the straight photo tube and binocular assembly is not guaranteed.**

◎At low zoom magnifications which present great depths of focus, use of a focusing magnifier (U-FT) is recommended for focusing accuracy.

6 SPECIFICATIONS

Item	Specification		
1. Zoom microscope body • SZX-ZB12 • SZX-ZB9	SZX-ZB12		SZX-ZB9
	Left/right zoom magnification system. Zoom drive system: Horizontal knob. Click stop ON-OFF switchable per zoom magnification.		
	Zoom ratio: 12.8 (0.7X to 9X) Magnification indications*: 7, 10, 12.5, 16, 20, 25, 32, 40, 50, 63, 90		Zoom ratio: 9 (0.63X to 5.7X) Magnification indications*: 6.3, 8, 10, 12.5, 16, 20, 25, 32, 40, 50, 57
* Total magnification with a 1X objective and 10X eyepiece.	Objective mount: Threaded mount		
	Built-in aperture iris diaphragm.		Use of AS unit (SZX-AS).
2. Focusing assembly • SZX-FOF • SZX-FO	SZX-FOF		SZX-FO
	Focusing system: Rack & pinion roller guide (with coarse focus adjustment knob tension adjustment ring).		
	Built-in counter balance. Coaxial coarse/fine focus adjustment knobs.		— Coarse focus adjustment knob only.
	Coarse focus adjustment knob stroke: 80 mm		
	Coarse knob stroke per turn: 36.8 mm		Coarse knob stroke per turn: 21.2 mm
	Fine focus adjustment knob stroke: 80 mm Fine knob stroke per turn: 1.5 mm		—
3. Observation tube • SZX-TR30 • SZX-BI30 • SZX-TBI	SZX-TR30	SZX-BI30	SZX-TBI
	Trinocular	Binocular	Tilting binocular
	Tube inclination: 30°		Tube inclination: 5° to 45°
	Light path selection: 2 steps (Bi 100%, Bi 20%:Photo 80%)	—	
	Interpupillary distance adjustment: 50 to 76 mm. Eyepiece clamping knob provided. Eyepiece: WHS series eyepiece.		
4. Standard base • SZX-ST	Pillar height: 270 mm. Base dimensions: 300(W) x 260(D) x 30(H) mm. Specimen holder attachable. With stage adapter mounting holes.		
5. Large base • SZX-STL	Pillar height: 400 mm. Base dimensions: 400(W) x 350(D) x 28(H) mm. Specimen holder attachable. With stage adapter mounting holes. With drop prevention collar (SZX-R).		

Item	Specification			
6. Objectives WD: Working distance PF: Parfocal lens	SZX-ZB12		SZX-ZB9	
	Model	WD	Model	WD
	DFPLFL0.3X	130 mm*	DFPL0.5X	198 mm*
	DFPLFL0.45X	198 mm*	DFPL0.75X	113 mm
	DFPLFL0.5XPF	70 mm	DFPLAPO1X-2	87.5 mm
	DFPLAPO1XPF	74 mm	SZX-ACH1X	90 mm
	DFPLAPO1.2XPF	60 mm	DFPL1.5X	53 mm
* Auxiliary pillar is required when SZX-ST is used.	DFPLFL1.6XPF	34 mm	DFPL2X-3	34 mm
	SZX-AL20X	10/7 mm		
7. Eyepiece	WHS10X-H:* 22 fields of view, diopter adjustment ring provided. CROSSWHS10X: 22 fields of view, with cross lines, diopter adjustment ring provided. WHS15X-H:* 16 fields of view, diopter adjustment ring provided. CROSSWHS15X: 16 fields of view, with cross lines, diopter adjustment ring provided. WHS20X-H:* 12.5 fields of view, diopter adjustment ring provided. CROSSWHS20X: 12.5 fields of view, with cross lines, diopter adjustment ring provided. WHS30X-H:* 7 fields of view, diopter adjustment ring provided.			
* 24 mm dia., 1.5 mm-thick eyepiece micrometers can be inserted.				
8. Operating environment	• Indoor use. • Altitude: Max. 2,000 m. • Ambient temperature: 5°C to 40°C. (41°F to 104°F) • Maximum relative humidity 80% for temperatures up to 31°C (88°F), decreasing linearly through 70% (at 34°C), 60% (at 37°C) to 50% (at 40°C).			

7 OPTICAL CHARACTERISTICS

■ **SZX-ZB12**

Objective	Eyepiece							
	WHS10X-H		WHS15X-H		WHS20X-H		WHS30X-H	
	Total Mag.	Field of view (mm)	Total Mag.	Field of view (mm)	Total Mag.	Field of view (mm)	Total Mag.	Field of view (mm)
DFPLFL0.3X	2.1X - 27X	104.8 - 8.1	3.15X - 40.5X	76.2 - 5.9	4.2X - 54X	59.5 - 4.6	6.3X - 81X	33.3 - 2.6
DFPLFL0.45X	3.15X - 40.5X	69.8 - 5.5	4.73X - 60.7X	50.8 - 4.0	6.3X - 81X	39.7 - 3.1	9.6X - 121.5X	22.2 - 1.7
DFPLFL0.5XPF	3.5X - 45X	62.9 - 4.9	5.25X - 67.5X	45.7 - 3.6	7X - 90X	35.7 - 2.8	10.5X - 135X	20.0 - 1.6
DFPLAPO1XPF	7X - 90X	31.4 - 2.4	10.5X - 135X	22.9 - 1.8	14X - 180X	17.9 - 1.4	21X - 270X	10 - 0.78
DFPLAPO1.2XPF	8.4X - 108X	26.2 - 2.0	12.6X - 162X	19.0 - 1.5	16.8X - 216X	14.9 - 1.2	25.2X - 324X	8.3 - 0.65
DFPLFL1.6XPF	11X - 144X	20 - 1.5	16.8X - 216X	14.3 - 1.1	22.4X - 288X	11.2 - 0.87	33.6X - 432X	6.25 - 0.49
SZX-AL20X*	(100X) - 225X	2.2 - 0.98	(150X) - 337.5X	1.5 - 0.71	(200X) - 450X	1.25 - 0.56	(300X) - 675X	0.7 - 0.31

* This is the auxiliary objective to be mounted on the DFPLAPO1XPF, and the magnifications shown are the recommended figures.

■ **SZX-ZB9**

Objective	Eyepiece							
	WHS10X-H		WHS15X-H		WHS20X-H		WHS30X-H	
	Total Mag.	Field of view (mm)	Total Mag.	Field of view (mm)	Total Mag.	Field of view (mm)	Total Mag.	Field of view (mm)
DFPL0.5X	3.15X - 28.5X	69.8 - 7.7	4.7X - 42.8X	50.8 - 5.6	6.3X - 57X	39.7 - 4.4	9.5X - 85.5X	22.2 - 2.5
DFPL0.75X	4.7X - 43X	46.6 - 5.1	7.1X - 64.1X	33.9 - 3.7	9.5X - 85.5X	26.5 - 2.9	14.2X - 128X	14.8 - 1.6
DFPLAPO1X-2	6.3X - 57X	34.9 - 3.9	9.5X - 85.5X	25.4 - 2.8	12.6X - 114X	19.8 - 2.2	18.9X - 171X	11.1 - 1.2
SZX-ACH1X	6.3X - 57X	34.9 - 3.9	9.5X - 85.5X	25.4 - 2.8	12.6X - 114X	19.8 - 2.2	18.9X - 171X	11.1 - 1.2
DFPL1.5X	9.5X - 85.5X	23.3 - 2.6	14.2X - 128.3X	16.9 - 1.9	19X - 171X	13.2 - 1.5	28.4X - 256.5X	7.4 - 0.82
DFPL2X-3	12.6X - 114X	17.5 - 1.9	18.9X - 171X	12.7 - 1.4	25.2X - 228X	9.9 - 1.1	37.8X - 342X	5.6 - 0.61

8 TROUBLESHOOTING GUIDE

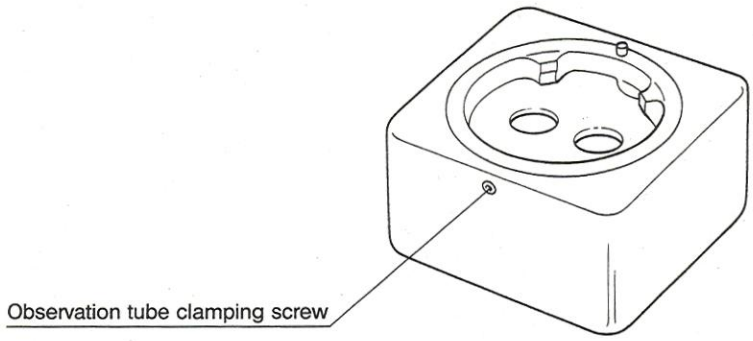
Under certain conditions, performance of this unit may be adversely affected by factors other than defects. If a problem occurs, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact your local Olympus representative for assistance.

Problem	Cause	Remedy	Page
1. Incomplete binocular vision.	Interpupillary distance is not correctly adjusted.	Adjust it correctly.	11
	Diopter adjustment is incomplete.	Complete diopter adjustment.	11
	Left and right eyepieces are not matched.	Use a pair of matched eyepieces.	5
2. Field of view is cut off or illuminated unevenly.	Aperture iris diaphragm is stopped down excessively.	Open the aperture.	9
	Observation tube and intermediate attachment are not correctly mounted.	Mount them correctly.	4
	Light path selector knob is stopped midway. (SZX-TR30)	Set correctly to the desired position.	13
3. Dust is visible in the field of view.	Dust on the specimen.	Remove dust.	ii
	Dust on eyepiece.	Remove dust.	ii
4. Excessive image contrast.	Aperture is stopped down excessively (when the built-in aperture iris diaphragm and SZX-AS are used).	Open the aperture to proper diameter.	9,20
5. Resolution problems: • Image is not sharp. • Insufficient contrast.	Objective is not correctly mounted.	Mount it correctly until it is stopped.	4
	Dust on objective front lens.	Clean lens surface.	ii
	Dust on top or lower lens of zoom microscope body.		
	Dust on upper or lower lens of zoom observation tube.		
6. Specimen image blurs when zoom magnification is changed.	Diopter ring is not correctly adjusted.	Adjust it correctly.	11
	Not in complete focus on specimen.	Focus specimen correctly at a high magnification.	11
7. Coarse focus adjustment knobs rotate with too much resistance.	Tension adjustment ring is too tight.	Loosen it properly.	8
8. Zoom microscope body drops or specimen goes out of focus during observation.	Tension adjustment ring is too loose.	Tighten it properly.	8

9 OPERATION OF OTHER ATTACHMENTS

9-1 Eyepoint Adjuster SZX-EPA

1 External View



2 Assembly (Fig. 29)

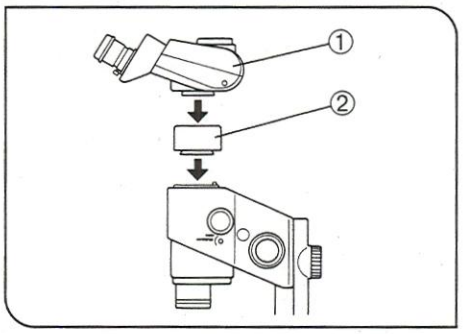
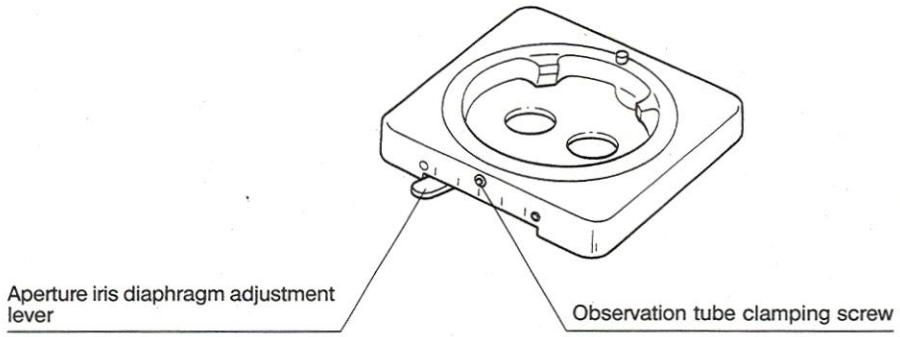


Fig. 29

1. Using the Allen screwdriver provided with the SZX microscope body, remove the observation tube ①.
2. Mount the eyepoint adjuster ② to the place where the observation tube has been mounted.
3. Mount the observation tube (removed in step 1 above) onto the eyepoint adjuster.
   This allows you to increase the eyepoint height by 40 mm. Up to two eyepoint adjusters can be mounted provided that no other intermediate attachment is used.

9-2 AS Unit SZX-AS (for use with the SZX-ZB9)

1 External View



2 Assembly

◎The AS unit can be mounted in the same manner as the SZX-EPA eyepoint adjuster, which is described in section 9-1.

3 Using the Aperture Iris Diaphragm

◎By adjusting the aperture iris diaphragm, it is possible to improve the contrast of the observed image and increase the depth of focus.

1. Slide the aperture iris diaphragm adjustment lever. Sliding it toward "O" on the left opens the aperture and sliding it toward "⊗" on the right closes it. Adjust while observing an image to check the effects of adjustment on contrast and depth of focus.

★**Do not close the aperture too much for this may cause degradation in resolution and/or cause ambient light to be insufficient.**

★**When the microscope is combined with the SZX-ILLC coaxial vertical illuminator, minimizing the aperture may obscure part of the observed field of view. In this case, open the aperture to an intermediate position.**

★**Minimizing the aperture and setting zoom magnification high tends to make ambient light insufficient.**

9-3 Drop Prevention Collar SZX-R and Auxiliary Pillar SZH-P400/SZH-P600

◎The auxiliary pillar is to be used when observing a large specimen or when it is required to move the microscope body height using a low-magnification objective.

◎The drop prevention collar prevents the zoom microscope body from dropping when installed at a high position using the auxiliary pillar and the clamping knob on the focusing assembly is loosened carelessly. This helps to prevent accidental damage to the specimen or objective.

★The static load resistance of the SZX-R is 7 kg at maximum.

1 Assembly (Fig. 30)

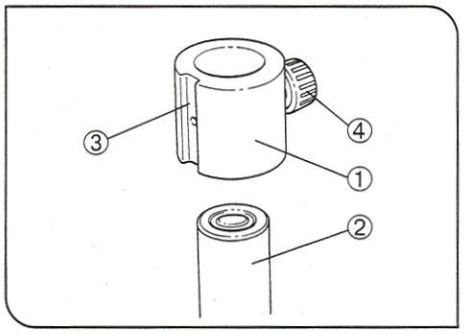


Fig. 30

1. Mounting the auxiliary pillar
   - Remove the pillar from the standard base and replace the pillar with the SZH-P400 or SZH-P600 auxiliary Pillar (see page 3 for the mounting procedure).
2. Mounting the drop prevention collar
   - Fit the drop prevention collar ① onto the auxiliary pillar ②.

◎Position the oblique illumination unit* mounting groove ③ on the front side of the drop prevention collar ① and tighten the clamping knob ④.

* The LSGA focal illumination unit and SZX-LGH1 light guide can be mounted.

★When the specimen height is low or an objective with a short working distance is used, the drop prevention collar ① does not have to be mounted if the working distance corresponding to the collar is not available. However, this reduces safety that is assured by using the SZX-R drop prevention collar ①, so be always sure to hold the focusing assembly when loosening the focusing assembly clamping knob.

2 Operation

⚠When moving the microscope body around the pillar, never loosen both the focusing assembly clamping knob and drop prevention collar simultaneously.

To move the microscope body upward

1. Loosen the clamping knob of the focusing assembly to be moved upward.
2. At the desired height, tighten the focusing assembly clamping knob securely.
3. Loosen the drop prevention collar clamping knob.
4. Press the drop prevention collar tightly against the lower end of the focusing assembly and tighten the clamping knob securely.

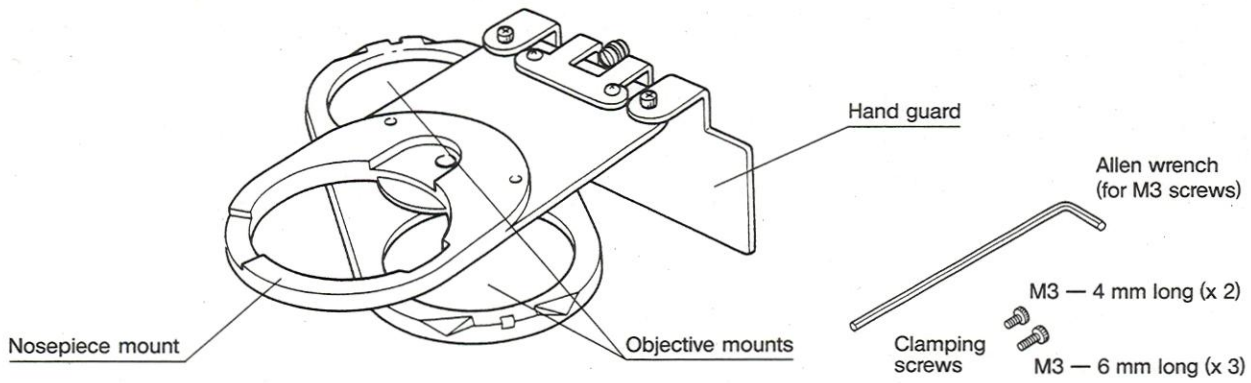
To move the microscope body downward

First loosen the drop prevention collar, then move the microscope body downward.

★For the drop prevention collar to exhibit its full effect, clamp the focusing assembly and drop prevention collar in close contact between each other, without leaving any space.

9-4 Revolving Nosepiece SZX-2RE

1 External View



2 Assembly (Figs. 31 - 34)

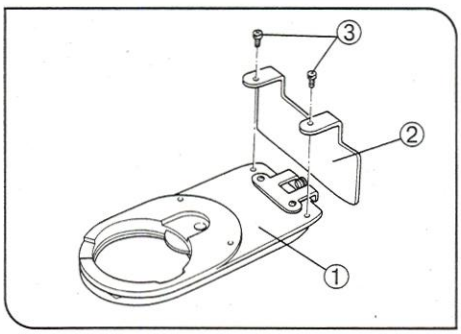


Fig. 31

1. Attach the hand guard ② to the revoling noseplece ① by tightening the provided 2 clamping screws ③ (M3 — 4 mm long) using the provided Allen wrench (for M3 screws). (Fig. 32)
2. Remove the observation tube and intermediate attachment from the zoom microscope body.
3. Remove the zoom microscope body and focusing assembly from the pillar, and place them upside down on a flat desk surface.

★**Place a soft sheet made of rubber or similar material on the desk surface.**

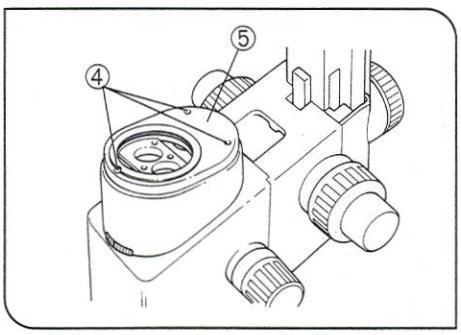


Fig. 32

4. Remove the objective from the zoom microscope body and remove the objective mount ⑤ by loosening the 3 clamping screws ④ using the provided Allen wrench (for M3 screws). (Fig. 32)

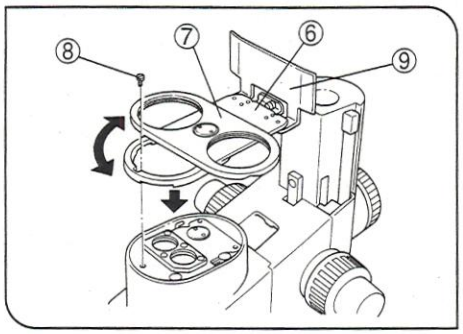


Fig. 33

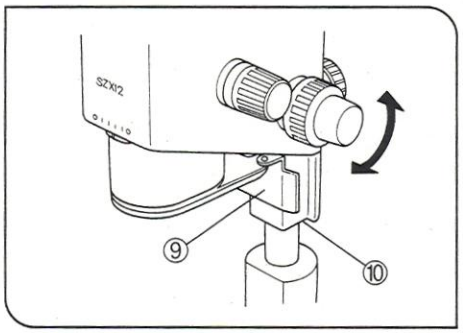


Fig. 34

5. Place the nosepiece mount ⑥ (with its objective mounts ⑦ facing upward) where the objective has been by aligning the screw holes. Using the Allen wrench (for M3 screws), clamp the revolver mount with the provided 3 clamping screws (M3 — 6 mm long). (Fig. 33)

★ As the screw holes may be hidden behind the objective mounts ⑦, clamp the nosepiece mount while rotating it. (Fig. 33)

★ Before installing the focusing assembly on the pillar, adjust the coarse and fine focus adjustment knobs so that the hand guard ⑨ does not protrude from the lower end of the focusing assembly ⑩. (Fig. 34)

6. Install the focusing assembly on the pillar, and install the observation tube and intermediate attachment which has been removed above in the original position.
7. Attach two objectives onto their respective objective mounts ⑦ by screwing. (Fig. 33)
8. Attach the magnification indicator ring provided with the objectives on the zooming knob (see page 10).

3 Operation (Fig. 35)

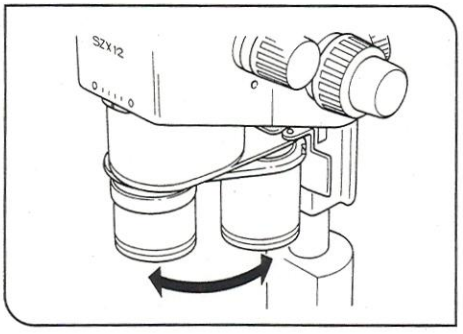


Fig. 35

Hold the objective and gently rotate it until a click position where the objective to be used is engaged in the light path.

4 Caution

★ When transporting the microscope, do not hold it by the revolving nosepiece.

★ Be careful not to pinch your finger between the hand guard and the objective when rotating it.

★ The parfocal property when the objective is replaced is not completely guaranteed.

9-5 BX Stage Adapter Type 1 SZX-STAD1

1 Introduction

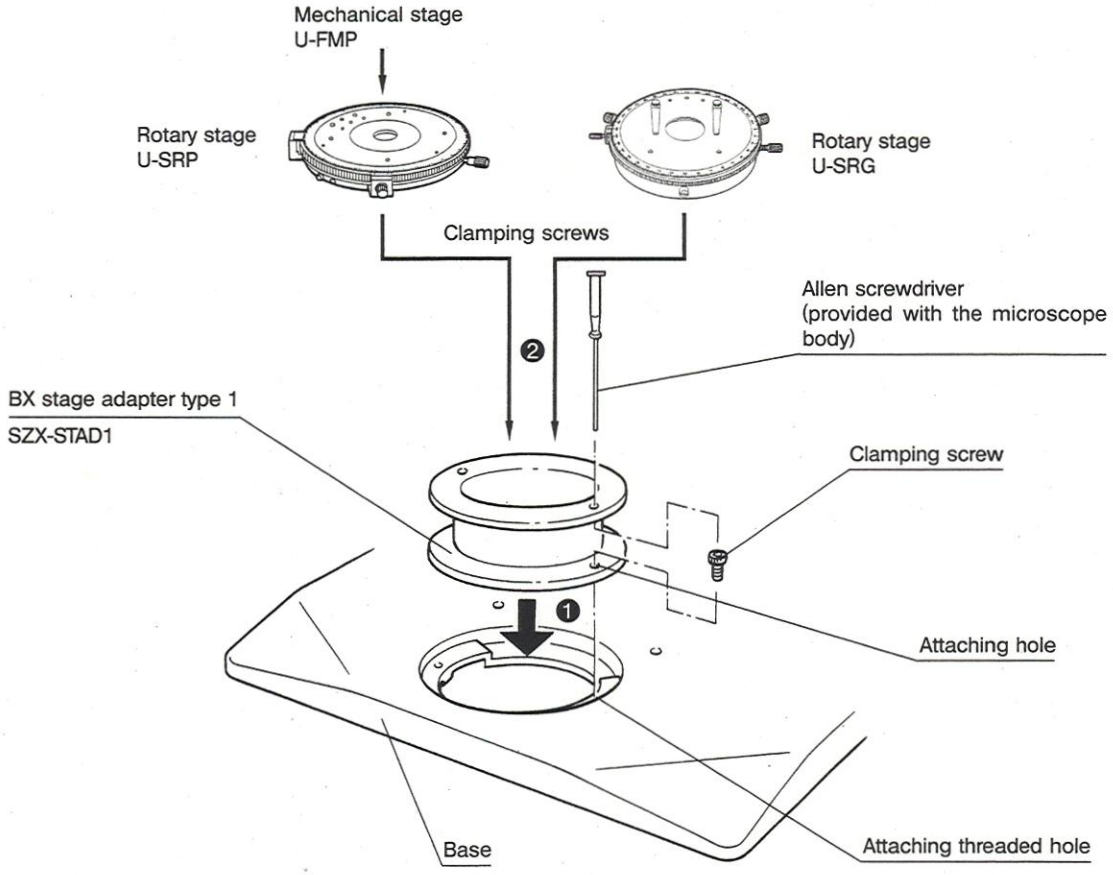
This adapter is for installation of a U-SRG or U-SRP rotary stage on the SZX standard base or a SZX series illumination base. When the U-SRP rotary stage is used together with the U-FMP mechanical stage, X-Y directional movement becomes possible, which is convenient for framing during photomicrography.

To cover the height of the stage adapter, we recommend combination with the SZH-P400 auxiliary pillar (together with the SZX-R drop prevention collar).

2 Mountable Bases, Restrictions

Base	Usable Objectives	Restrictions
Standard base SZX-ST	0.5X to 2X	None
• Transmitted illumination base SZX-ILLK • Advanced illumination base SZX-ILLB • Brightfield/darkfield transmitted illumination base SZX-ILLD	The same restrictions apply regardless of whether the stage adapter is used or not. (Refer to the SZX illumination base's instruction manual.) Note that the field illuminated by the transmitted light is limited depending on the diameter of the opening of the stage plate in use. **★ Darkfield observation is not possible using the SZX-ILLD.** **★ The illumination intensity may be reduced when a frosted filter is used.**	

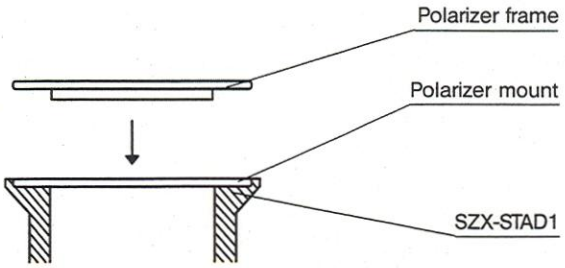
3 Assembly



Mounting the Polarizer (SZX-PO)

When simplified transmitted polarized light observation is required, install the polarizer on the SZX-STAD1 BX stage adapter type 1.

To install the polarizer, place the polarizer frame in the polarizer mount on the upper part of the SZX-STAD1.



9-6 BX Stage Adapter Type 2 SZX-STAD2

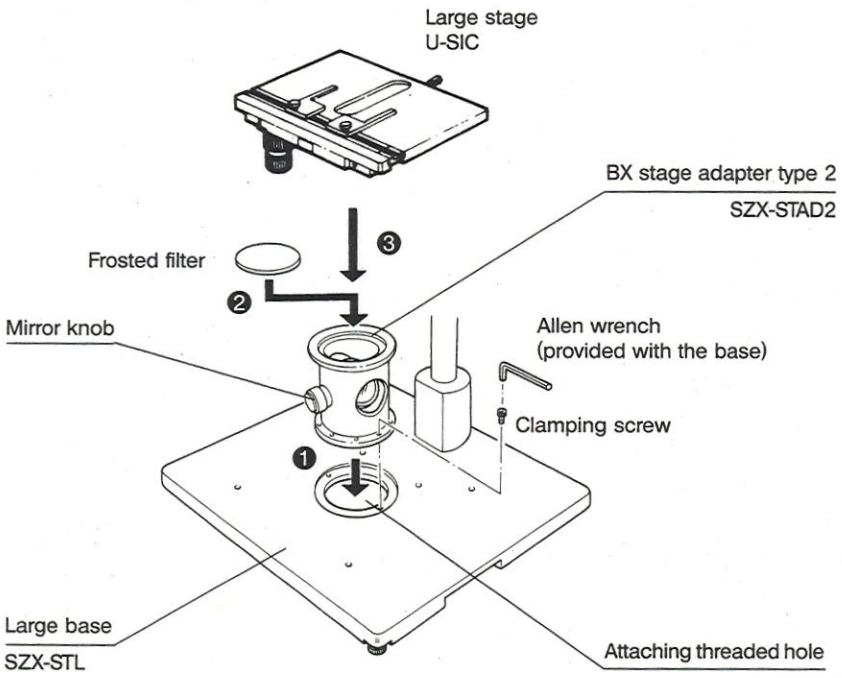
1 Introduction

This adapter is for installing the U-SIC large stage* on the SZX-STL large stand**. When this stage adapter is used, the SZH-P400 auxiliary pillar should be used to cover the height of the stage adapter. In addition, when an objective with a long working distance (DFPLFL0.3X, DFPLFL0.45X or DFPL0.5X) is used, the SZH-P600 auxiliary pillar should be used (always together with the drop prevention collar).

* The U-SVL or S-SVR BS stage can also be used, but the U-SVLB and U-SVRB cannot be used due to poor operability and long stage knobs.

** A SZX series illumination base can also be used, but its built-in transmitted illumination cannot be used.

2 Assembly



★For simplified transmitted light observation, place the mirror knob on the front and use a frosted filter.

3 Simplified Transmitted Light Observation (Fig. 36)

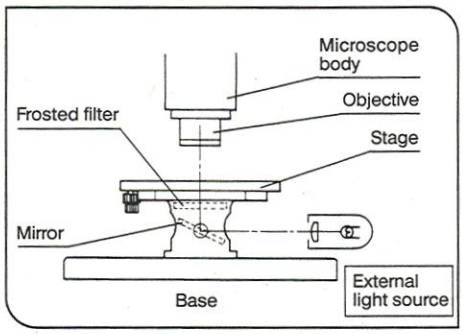


Fig. 36

1. Illuminate the specimen with an external light source (LSD illuminator, light guide illuminator, etc.).
   Light the external light source as shown in the figure on the left and irradiate the mirror assembly.
2. Eliminate irregularities in illumination.
   1) Align the microscope body center with the center of the SZX-STAD2.
   2) Set the zooming knob on the microscope body to the minimum magnification and focus the stage top surface.
   3) While observing through the eyepiece, rotate the mirror knob to adjust the mirror angle so that the entire field of view is illuminated uniformly.

◎When observing using an oblique illuminator, remove the frosted filter and while observing through the eyepiece, tilt the mirror gradually until optimum contrast can be obtained.

4 Caution

★Do not project the image of the external light source filament on the frosted surface of the frosted filter. Otherwise the frosted filter may deteriorate.

★Use neutral detergent to clean the frosted filter.

★In transmitted light observation at a total magnification of no more than 10X, the field of view may be obscured in the peripheral sections depending on the stage in use.

9-7 Stage Adapter Type 1 SZH-STAD1

This adapter has the same function as the SZX-STAD1 BX stage adapter type 1, but the usable stages with this adapter are the BH2-SH horizontal knob stage and the BH2-SRG rotary stage.

The assembly and polarizer installation procedures for this adapter are identical to those for the SZX-STAD1. Refer to the SZX-STAD1 description for related information (page 25).

OLYMPUS®

OLYMPUS OPTICAL CO.,LTD.
2-43-2,Hatagaya, Shibuya-ku, Tokyo, Japan
OLYMPUS OPTICAL CO.(EUROPA) GMBH.
Postfach 10 49 08, 20034, Hamburg, Germany
OLYMPUS AMERICA INC.
2 Corporate Center Drive, Melville, NY 11747-3157, U.S.A.
OLYMPUS SINGAPORE PTE LTD.
491B River Valley Road, #12-01/04 Valley Point Office Tower, Singapore 248373
OLYMPUS OPTICAL CO.(U.K.) LTD.
2-8 Honduras Street, London EC1Y OTX, United Kingdom.
OLYMPUS AUSTRALIA PTY. LTD.
104 Ferntree Gully Road, Oakleigh, Victoria, 3166, Australia